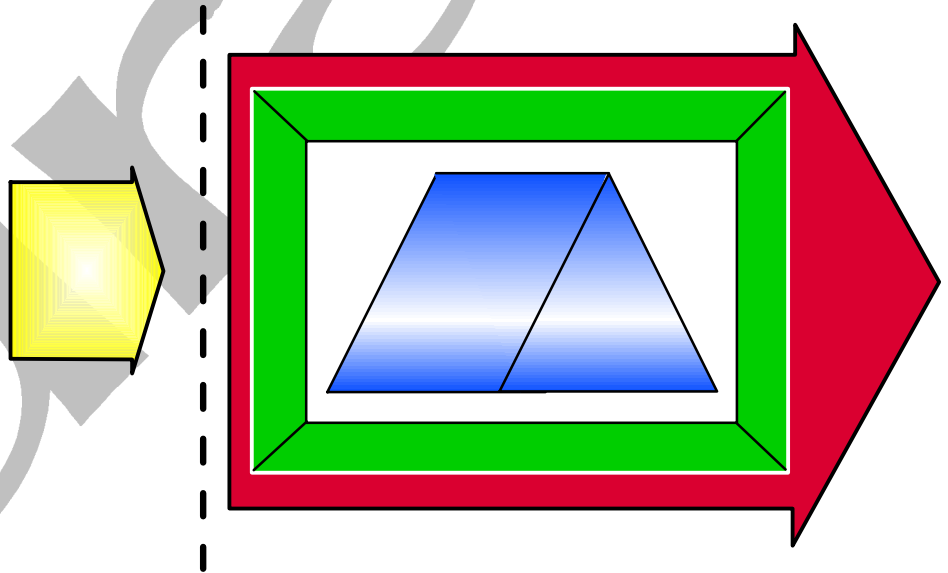


# FEDERAL ITA CONCEPTUAL MODEL



# **FEDERAL ITA CONCEPTUAL MODEL**

## **TABLE OF CONTENTS**

	<b>PAGE</b>
<b>INTRODUCTION</b>	
<b>OVERVIEW OF THE MODEL</b>	
<b>LEVEL I</b>	
<b>LEVEL II</b>	
<b>LEVEL III</b>	
<b>OUTLINE OF THE MODEL</b>	
<b>EXTERNAL ARCHITECTURE DRIVERS</b>	
<b>STRATEGIC DIRECTION</b>	
<b>ARCHITECTURE FRAMEWORK</b>	
<b>ARCHITECTURE SEGMENTS</b>	
<b>ENTERPRISE ARCHITECTURE MODEL</b>	
<b>NEXT STEPS</b>	
<b>GLOSSARY OF TERMS</b>	
<b>SUBGROUP PARTICIPANTS</b>	

## INTRODUCTION

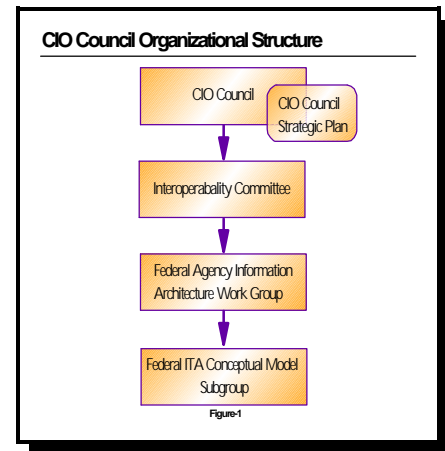
In April of 1998, the Federal ITA Conceptual Model Subgroup was formed for the primary purpose of developing a Federal Information Technology Architecture (ITA) Conceptual Model, in response to the CIO Council Strategic Plan, January 1998.

Traditional architecture efforts require a substantial initial investment in time and dollars. First, the current baseline must be captured, and then a target architecture must be developed. Only after these efforts are completed, is it possible to begin to implement needed architecture changes. Yet, today, many initiatives are underway for implementing new Federal architectures. These initiatives<sup>1</sup> are important for supporting Federal business needs and cannot be stalled pending the development of a current Federal architecture and a target Federal architecture.

Experts in the field of architecture note that only 20% of an enterprise architecture is strategically valuable. This means that 80% of this large effort yields little reward. To achieve the greatest return from an architecture effort, it is important to target the worthwhile 20% of architecture activities. These tend to be today's architecture initiatives. The challenge for a successful Federal architecture is to allow, indeed encourage, the development of an initiative, while providing an organizational framework for integrating the initiatives into a cohesive, holistic picture.

The goal of the Subgroup was to develop a simple high level model, consisting of modular diagrams and definitions, for communicating the overall organization and relationships of *all* architecture components required for developing and maintaining a Federal architecture. The diagrams must be modular and allow for decomposition into more detailed levels. The model must be flexible to easily allow for the addition of new activities which may arise over time, and to allow for easy integration of existing agency architectures. Additionally, and most importantly, the model must focus on *common* Federal architecture activities, must address the realities of the Federal workplace, must not be overly burdensome to populate, and must provide for needed immediate successes.

The Subgroup used the July 1998 OMB Guidance, including the OMB Model diagram, as a starting point. Considering the OMB model diagram as *one* component of the Federal ITA Conceptual Model, the Subgroup did two things: identified four additional components needed for developing and maintaining a Federal architecture, and drilled down a level from the OMB model to achieve a



---

<sup>1</sup>Examples of Federal initiatives include ...

further granularity of detail.

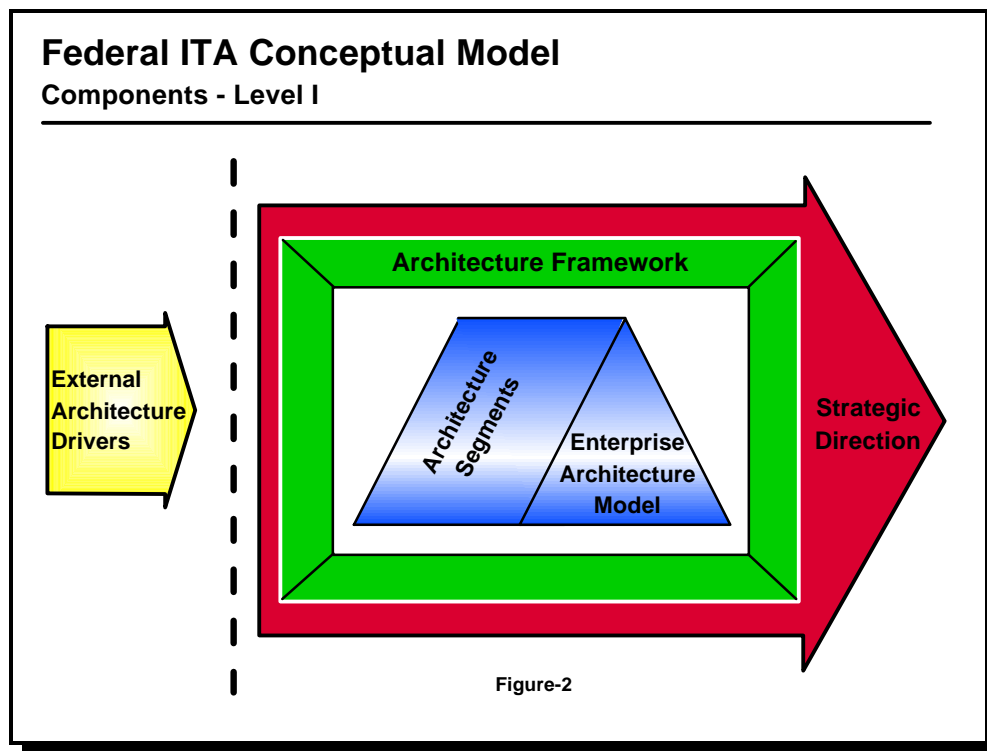
The result of this three month effort is this draft conceptual model, including diagrams, defined in this document. It is important to understand that this effort does not attempt to define the Federal architecture content. Rather, this effort defines an organizational framework and place-holder for architecture activities, for *future* population of Federal architecture information.

For the purposes of this document, the Federal ITA Conceptual Model consists of three levels. The model is flexible enough to allow for additional decomposition. It is expected that as new activities are identified, they can be plugged into the appropriate component and decomposed as necessary.

## OVERVIEW

This section of the document provides an overview of the three levels of the Federal ITA Conceptual Model, their inter-relationships, and their workings. Definitions for the components at each level, and further details, are provided in the following section, Outline of the Model.

**Level I** At the highest level, Level I, the Federal ITA Conceptual Model consists of five components, four of the components are internal to the model and one component is external to the model. The flow of the model is from left to right. The external component, called the *External Architecture Drivers*, is what causes the architecture to change. If this change agent is of a certain magnitude, it might impact the *Strategic Direction* of the architecture, which will, in turn, cause changes in the *Architecture Framework*. More likely, the Strategic Direction will remain stable, but the Architecture Framework will be mobilized into action. Changes are applied to the Architecture Framework through the *Architecture Segments* using the *Enterprise Architecture Model*.



The External Architecture Drivers address *why* the Federal Architecture needs to change. The Strategic Direction links to the CIO Council Strategic Plan, and supplies the motivation for the architecture, by answering the questions “*Why* do we need a Federal Architecture?” and “*Where* are we headed?”. The Architecture Framework addresses *what* the architecture is and *how* and *when* it will be developed and maintained. The Architecture Segments identify a subset/portion of the Federal architecture *which* is to be worked as a self contained section. The Enterprise Architecture Model lays out *how* to address the subsets/portions of the total architecture.

**Level II** At level II, the five high level components are decomposed into more detailed components. The flow of the model continues from left to right.

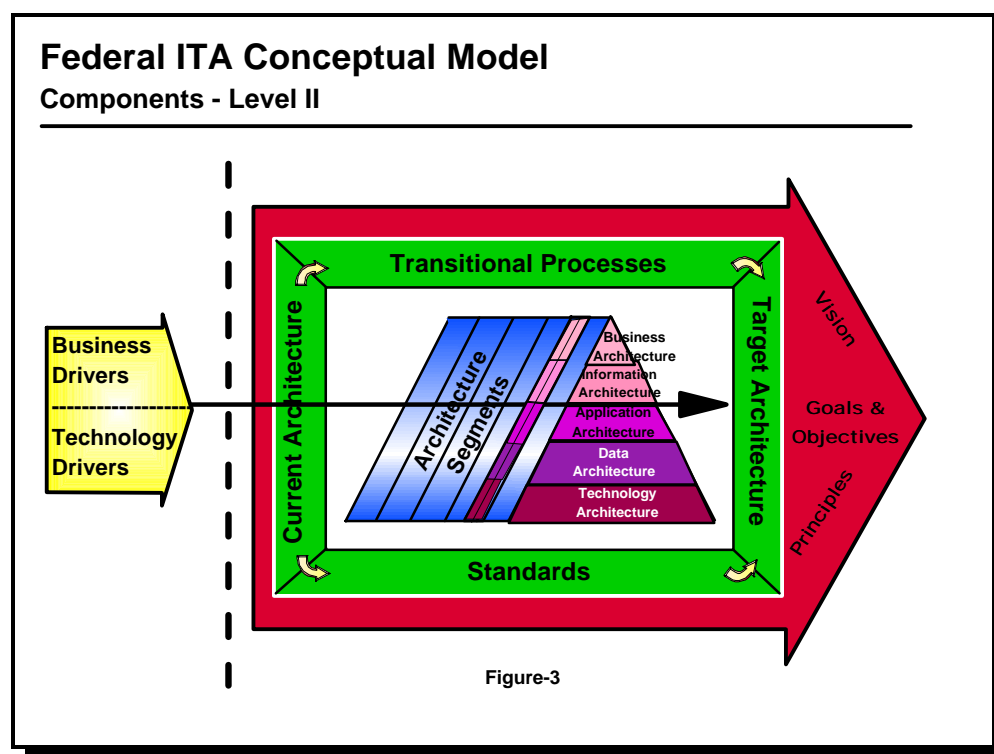


Figure-3

The External Architecture Drivers consist of two types of drivers: *Business Drivers* and *Technology Drivers*. Examples of Business Drivers include the Clinger-Cohen Act requiring the development of architectures, and the various reinvention activities which are redefining Federal missions. An example of a Technology Driver is the Internet and its revolutionizing way of meeting business needs. These drivers cause the architecture to change.

The Strategic Direction consists of: a Federal *Vision*, *Goals & Objectives*, and *Principles*. The Strategic Direction tends to remain stable over time.

The Architecture Framework consists of: a *Current Architecture*, a *Target Architecture*, *Standards*, and *Transitional Processes*. The Current Architecture defines the baseline. The Target Architecture defines what changes need to be implemented. The Transitional Processes<sup>2</sup> and Standards define how and when changes are to be applied. Standards are used to implement changes from the current architecture to the target architecture.

The Enterprise Architecture Model, the triangular piece in the center of the diagram, consists of five layers: the *Business Architecture*, the *Information Architecture*, the *Application Architecture*, the *Data Architecture*, and the *Technology Architecture*. With few changes<sup>3</sup>, the Enterprise Architecture Model was pulled directly from the OMB Model, which also sports a triangular shape and five layers. The layered approach provides the ability to view horizontal cross sections of an architecture to ensure consistency and cohesiveness within the layers. It is conceivable that a Federal architecture oversight group might be charged with overseeing the evolution of each horizontal layer of this model.

The top two layers of the Enterprise Architecture Model tend to respond to changes in business needs, while the bottom three layers of the model tend to respond to changes in technology. Traditionally, architecture efforts have focused on the technology driven portions of the model. Less effort has been spent on the business driven portions of the model. This tradition has resulted in bottom-up approaches to architecture that often fall short of reaching the top, resulting in a disconnect between the technology and the business it was meant to support. Traditional architecture activities have failed, because of a lack of business management involvement at the top layers. For a Federal architecture to be successful, it must have a top-down approach, whereby the business needs drive the technology, with adequate involvement from the line-of-business managers.

**The real value in this Federal ITA Conceptual Model is the concept of the Architecture Segments.** In a perfect world, the Federal government would halt all current in-progress Federal architecture activities, long enough to develop a Current Architecture - several years. After completing the Current Architecture, the Federal government would embark on completing a Target Architecture - several more years. Once both efforts are completed (if ever), and assuming no new changes occur in business needs or technology over this time-period (bad assumption), the Federal government would be ready to *start* implementing badly needed architecture changes. What's wrong with this model? It does not address today's business needs. Many Federal work groups are already

---

<sup>2</sup> Transitional Processes (such as the IT Investment Review Process) identify, prioritize, fund, and oversee, the development and maintenance of Architecture Segments.

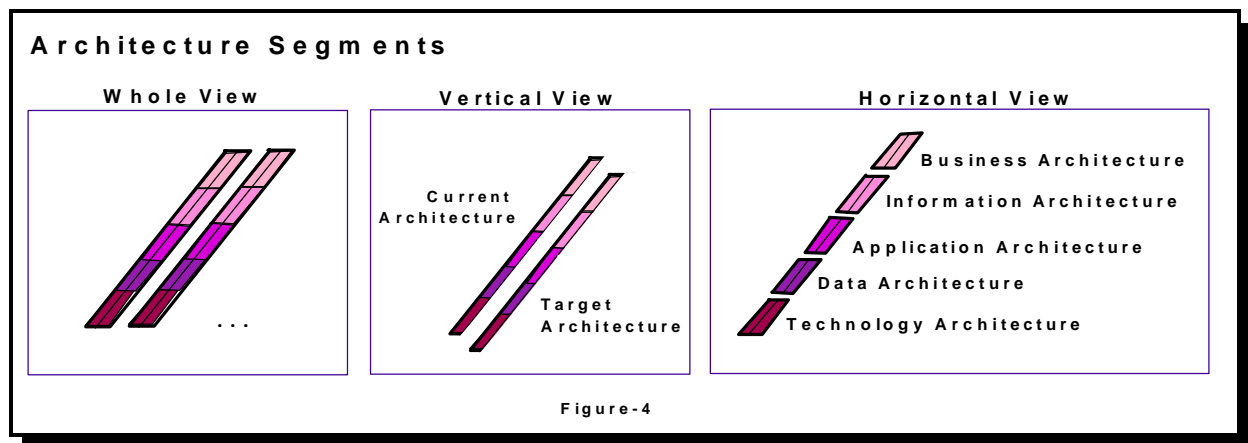
<sup>3</sup> The Subgroup was hesitant to substantially modify the OMB five-layer model for the following reasons: 1) The OMB model has been well received throughout the Federal community, 2) The OMB model is based on the NIST model, which has been in use for many years and has withstood the test of time, 3) Many agencies are currently using the OMB model to guide their development efforts, 4) The model has already been through a review process by agencies addressing their retrofitting concerns, 5) The model has served to educate the Federal community about architecture, and has introduced terminology which is gaining acceptance. 6) Individual agencies do have the flexibility to modify the five-layer model as needed.

addressing today's "hot issues" for architecture, and cannot afford to wait for the completion of a current and target Federal architecture. The solution lies with the concept of the Architecture Segments.

An Architecture Segment, such as a "hot issue", is a *part* of the whole architecture, to be developed and maintained within the constructs of the Federal ITA Conceptual Model. The Architecture Segment component of the model provides the organizational structure for identifying, prioritizing, and managing, "hot issues" or "immediate successes". Additionally, the Architecture Segment provides a holding place for listing multiple Architecture Segments, allowing for further drill-down and storage of information about these Architecture Segments.

Architecture Segments may result from changing business needs, changing technologies, or both. Examples of technology driven Architecture Segments include an Email architecture, an Electronic Signature architecture, or a Geospatial architecture. An example of a business driven architecture might be a Public Access architecture. An example of a combined business driven and technology driven architecture might be a Security architecture.

Each Architecture Segment contains architecture information which can be viewed vertically as Current and Target Architecture information, or viewed horizontally as architecture information for each layer of the Enterprise Architecture Model.



Viewed vertically, Architecture Segments represent incremental parts of the Current and Target Architectures. For example, an Email architecture would address the current Federal Email architecture and the target Federal Email architecture.

Viewed horizontally, Architecture Segments represent incremental parts of the five architecture layers. An Architecture Segment addresses each of the five layers of the Enterprise Architecture Model, narrowly, within the context of its scope. For example, an Email architecture would address the *Business Architecture*, *Information Architecture*, *Application Architecture*, *Data Architecture*,



and *Technology Architecture*, needed to support Federal interoperable Email. Email Policy would be handled through the top two business-driven layers of the model. Email technologies, such as Email systems, Email files and interfaces, and Email communications, would be addressed through the bottom three technology-driven layers of the model.

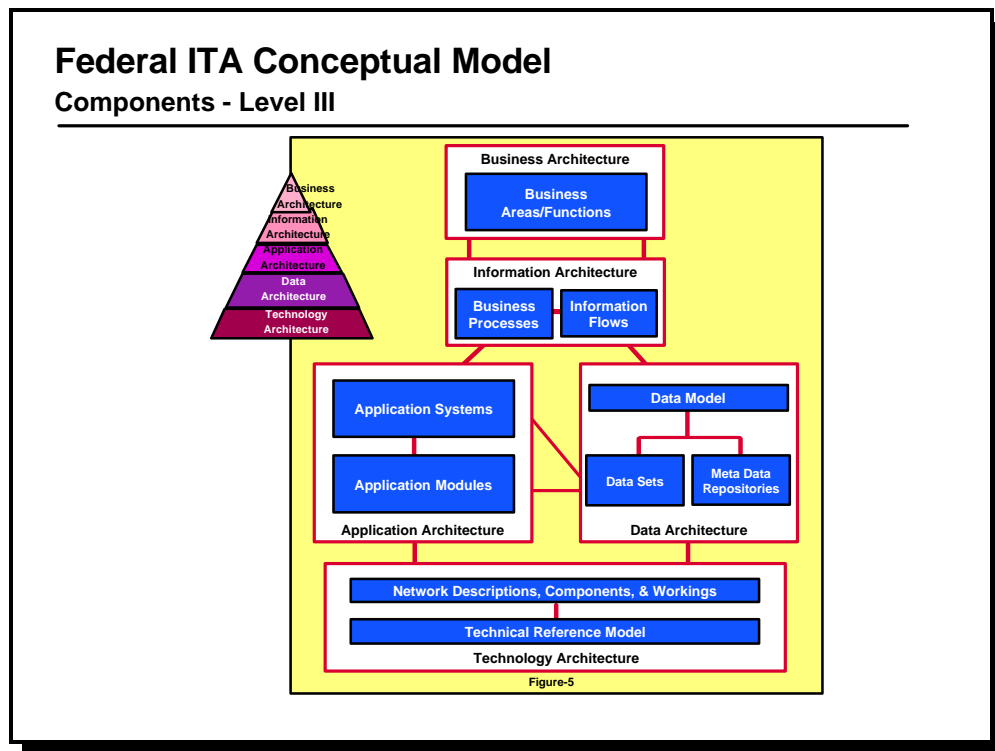
The key value to the concept of Architecture Segments is that they allow the for *incremental* development of the vertical architectures and the horizontal architectures, while focusing on today's "hot issues". Conceivably, an Architecture Segment might be developed and maintained by a Federal workgroup under strong individual leadership. The Federal workgroup would focus on the issue at hand and not on the entire Federal architecture, would focus on developing the *part* of the Current and Target Architectures that *apply directly* to the Architecture Segment, and would address the five layers of the Enterprise Architecture Model as relates *specifically* to the Architecture Segment. The Federal Workgroup would also convene the customer group interested in this *particular* architecture issue<sup>4</sup>.

Before an Architecture Segments could be implemented, a Federal architecture oversight group would review the Architecture Segment to ensure vertical and horizontal integration into the Federal architecture. The Federal architecture oversight group would ensure consistency with the five layers of Enterprise Architecture Model, consistency with the Strategic Direction, and incorporation into the Current and Target Architectures. In this manner, the Federal Architecture, vertical and horizontal views, would evolve over time, allowing for the immediate successes gained from resolving "hot issues".

---

<sup>4</sup> One could argue that there are no customers for an entire architecture outside of the IT community, yet there are many customers for specific Segment Architectures.

**Level III** At level III, each of the five layers of the Enterprise Architecture Model are decomposed into further detail. Notice that the lines in the model do not contain arrows. This was done intentionally as the model does not attempt to depict sequential flow, nor to identify the nature of the relationships<sup>5</sup>.



The Enterprise Architecture Model provides a common structure for developing a Current Architecture, a Target Architecture, and individual Segment Architectures.

First, the business areas for the enterprise are defined. For each business area, the functions are defined. The functions are then decomposed into business processes and information flows.

The business processes are used to develop the Application Architecture, while the information flows are used to develop the Data Architecture. Both the Application and Data Architectures drive the Technology Architecture.

---

<sup>5</sup> Ordinarily, a break-down at this level would depict a type of relationship, such as one-to-one, one-to-many, etc.

## OUTLINE OF THE MODEL

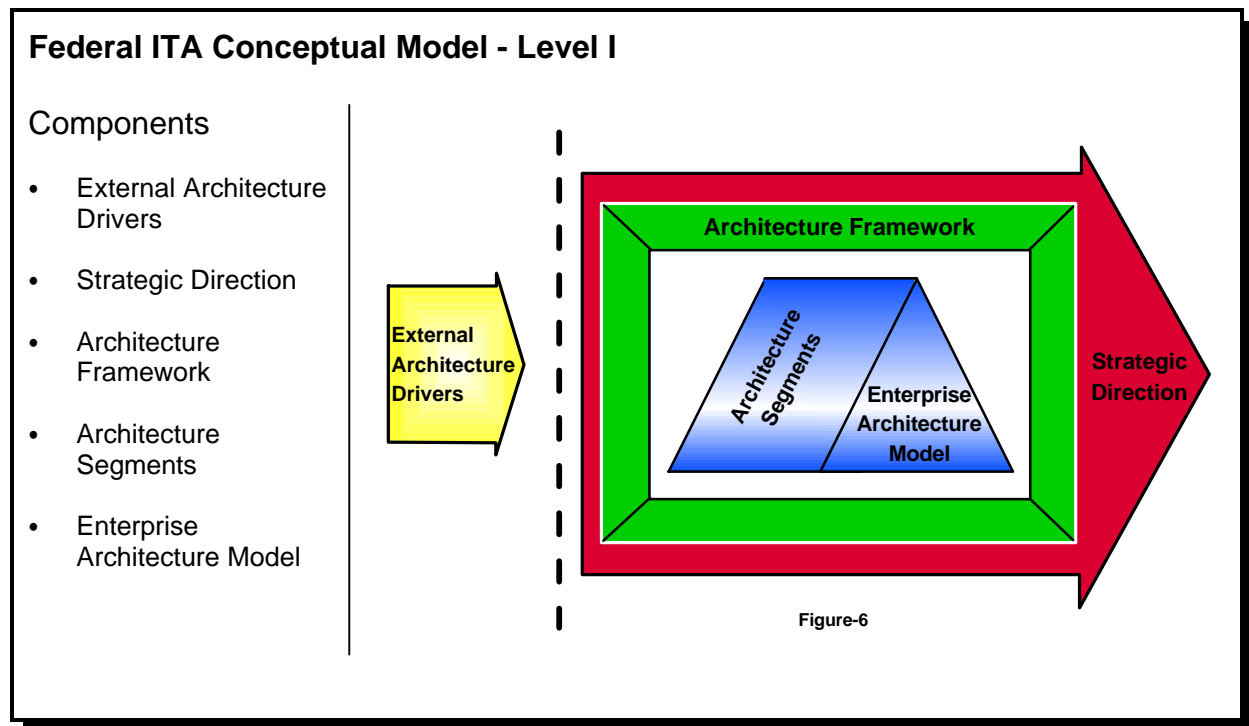
This outline contains the diagrams and definitions of the components and subcomponents of the Federal ITA Conceptual Model. The outline discusses an ITA, and then is broken down by the ITA components, with the relating subcomponents listed and defined. The Enterprise Architecture Model components are decomposed further to show relationships between the components. The Model is not populated with specific Federal architecture information, rather it defines the framework for an architecture.

### Federal Information Technology Architecture

An Information Technology Architecture is defined as:

- Integrated Framework
- For Evolving/Maintaining existing Information Technology
- For Acquiring new Information Technology
- To achieve Federal Strategic Goals and Federal Information Technology Goals
- Integrates work processes and information flows with technology
- Specifies standards that enable information exchange and resource sharing
- Only addresses “common” issues across Federal government

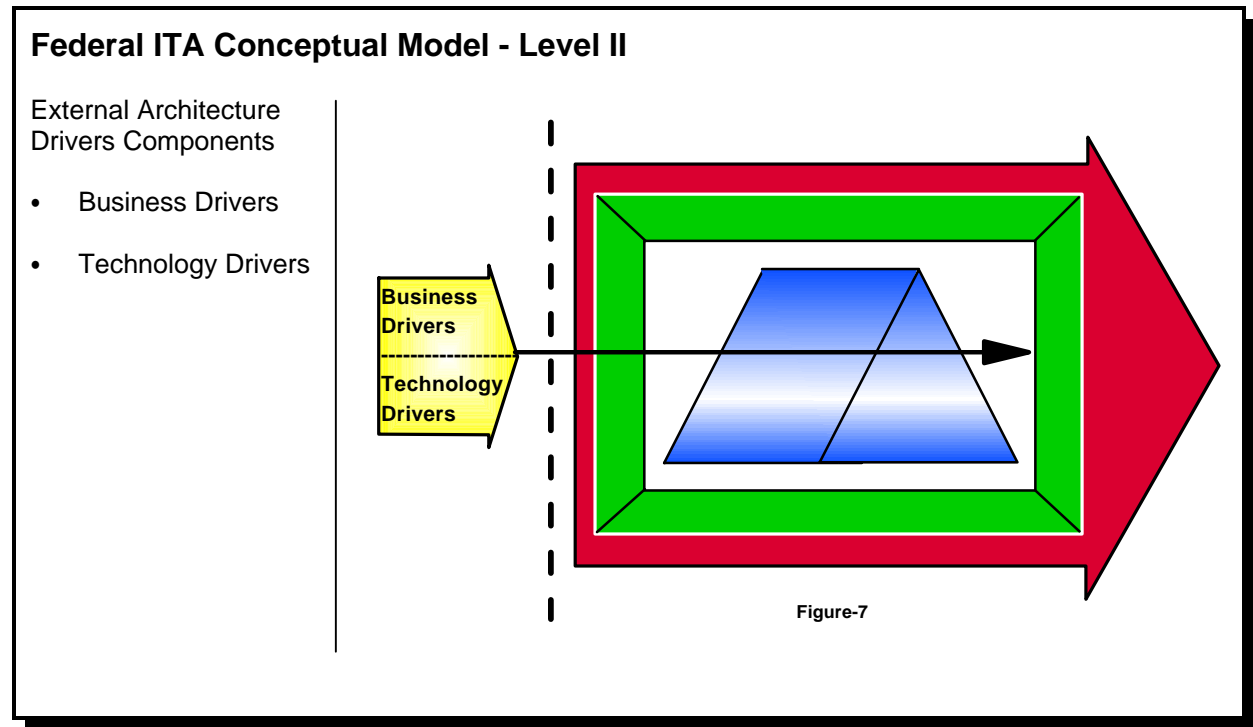
The Federal ITA Conceptual Model is made up of five components, as depicted in Figure 6 below.



## 1. External Architecture Drivers

The External Architecture Drivers consists of two components as depicted in Figure 7 below, and is defined as:

- External forces which cause changes in the Business Needs
- External market forces introducing new Technologies offering new potentials
- Opportunities offering new capabilities for the Federal arena including Federal customers and stakeholders



### 1.1 Business Drivers

- A component of the External Architecture Drivers
- New Business Needs requiring changes to the Target Architecture

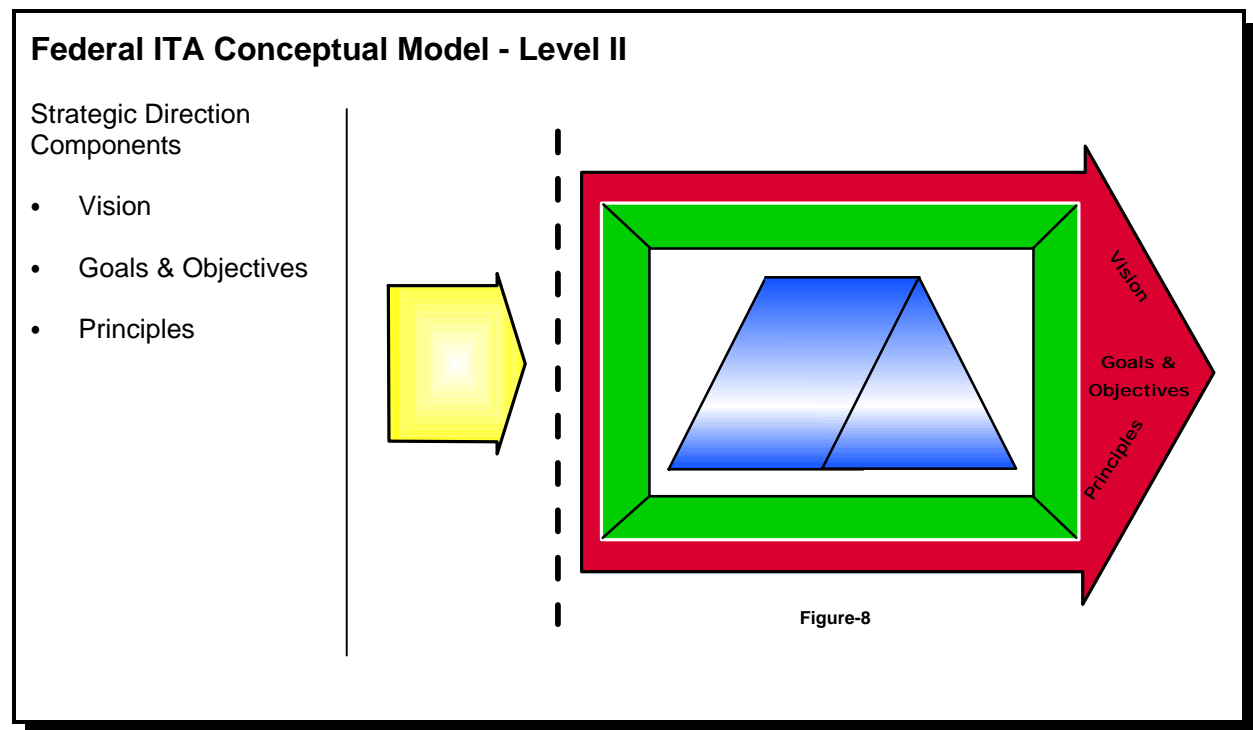
### 1.2 Technology Drivers

- A component of the External Architecture Drivers
- New Technologies offering new solutions for Business Needs
- Offers potential rewards for changing the Target Architecture

## 2. Strategic Direction

The Strategic Direction consists of three components as depicted in Figure 8 below, and is defined as:

- A Component of the Federal ITA Conceptual Model
- Maintains consistency with Federal direction (as stated in documents such as the NPR, the Blair House Papers, and the CIO Council Strategic Plan)
- Defines the motivation for developing a Federal architecture
- Guides the development of the Federal architecture
- Responds to External Architecture Drivers such as changing Business Needs and Emerging Technologies



### 2.1 Vision

The Vision is defined as:

- A component of the Strategic Direction
- Long term architecture picture
- Provides strategic direction
- Looks five (5) years out

### 2.2 Goals & Objectives

The Goals and Objectives are defined as:

- A component of the Strategic Direction
- Describes opportunities to accomplish the Vision
- Addresses commonality of ITA activities to improve interoperability

### **2.3 Principles**

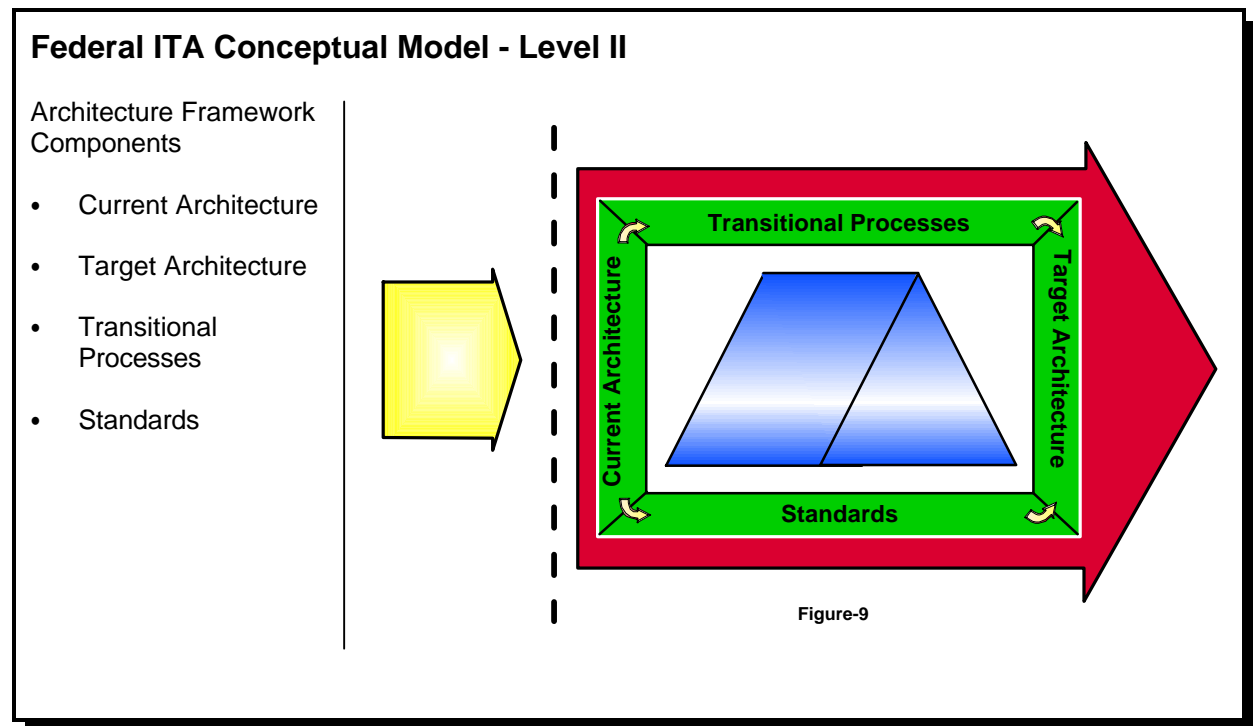
The Principles are defined as:

- A component of the Strategic Direction
- Contains statements which:
  - Provide Strategic Direction to support the Vision
  - Guide decision making
  - Withstand the test of time
  - Are not prescriptive

### 3. Architecture Framework

The Architecture Framework consists of four components as depicted in Figure 9 below, and is defined as:

- A component of the Federal ITA Conceptual Model
- An overall implementation framework
- Addresses the Current Federal Architecture, the Target Federal Architecture, and the Processes and Standards used for migrating from the current to the target



#### 3.1 Current Architecture

The Current Architecture is defined as:

- A Component of the Architecture Framework
- Populates all components of the Enterprise Architecture Model
- Describes the common elements of the Current Federal Architecture
- Represents the cumulative “as-is” or “baseline” Federal architecture

#### 3.2 Target Architecture

The Target Architecture is defined as:

- A Component of the Architecture Framework
- Populates all components of the Enterprise Architecture Model
- Represents a future target for the Federal architecture
- Aims to move the Current Federal Architecture closer to the Federal architecture Vision

- Tends toward the Federal Strategic Direction
- Responds to Federal External Architecture Drivers such as changing Business Needs, or Emerging Technologies and Market Trends

### **3.3 Transitional Processes**

The Transitional Processes are defined as:

- A Component of the Architecture Framework
- Defines all processes for migrating from the Current Architecture to the Target Architecture
- Answers migration questions such as “who”, “how”, and “when”
- Contains:
  - A Legacy Systems Integration Plan/Process to focus on interfacing with new systems, in order to operate in a cost-effective manner
  - A Migration Plan/Process for prioritizing, coordinating, and managing the migration of Federal Architecture Segments from the Current Architecture to the Target Architecture
  - A Technology Evaluation Plan/Process for evaluating potential new Federal technologies
  - A Capital Planning Plan/Process to ensure consistency and compliance with the Federal IT architecture and to review and prioritize Architecture Segment investments
  - An IT Architecture Certification and Waiver Plan/Process for managing a level of compliance and exceptions to the IT architecture
  - A Communication Plan/Process for disseminating Federal IT architecture information to the all customers
  - A Training Plan/Process for evaluating and providing continuous training to Federal employees
  - An IT Personnel Plan/Process for attracting and keeping valuable IT professionals in Federal service to successfully implement and support the IT architecture

### **3.4 Standards**

Standards is defined as:

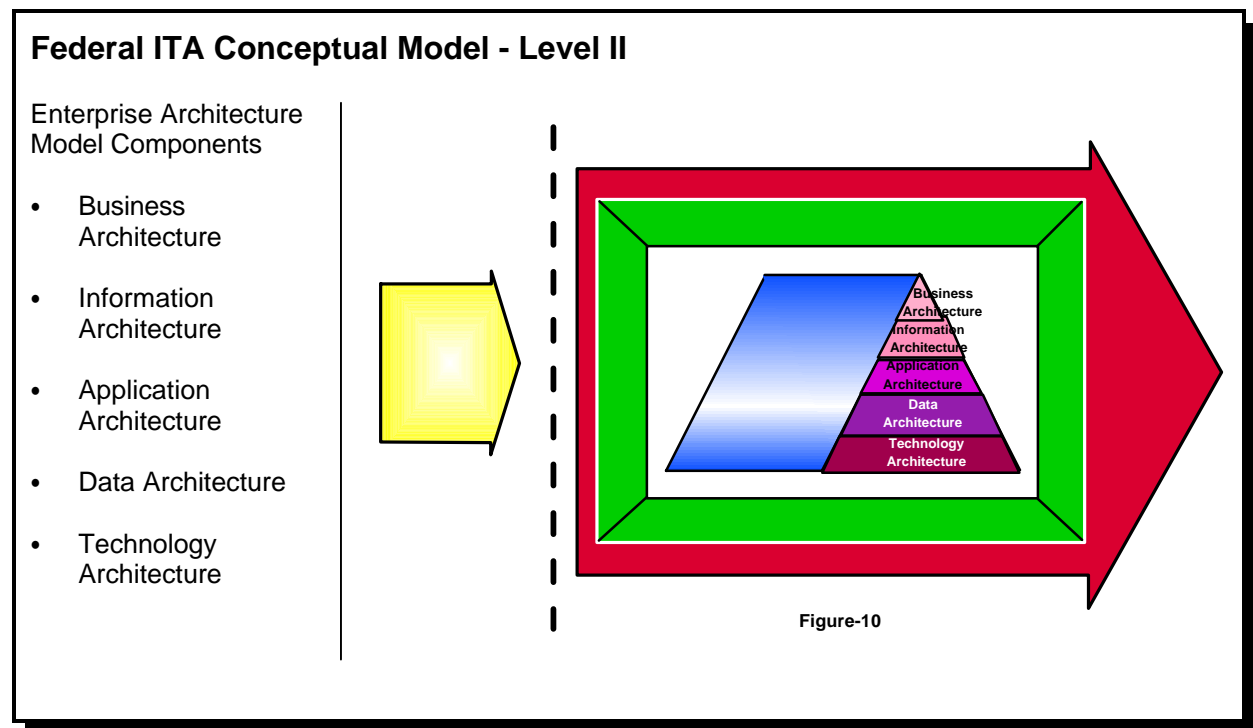
- A Component of the Architecture Framework
- A set of criteria/guidance which promotes interoperability
- Can be defined for one or more layers of the Enterprise Architecture Model
- Examples include:
  - Federal Product Standards
  - Federal Technical Standards (OMB refers to this as the “Technical Standards Profile”)
  - Federal Security Standards (OMB refers to this as “Security Standards Profiles” and “Standards Profiles”)
  - Federal Interface Standards
  - Federal Service Standards



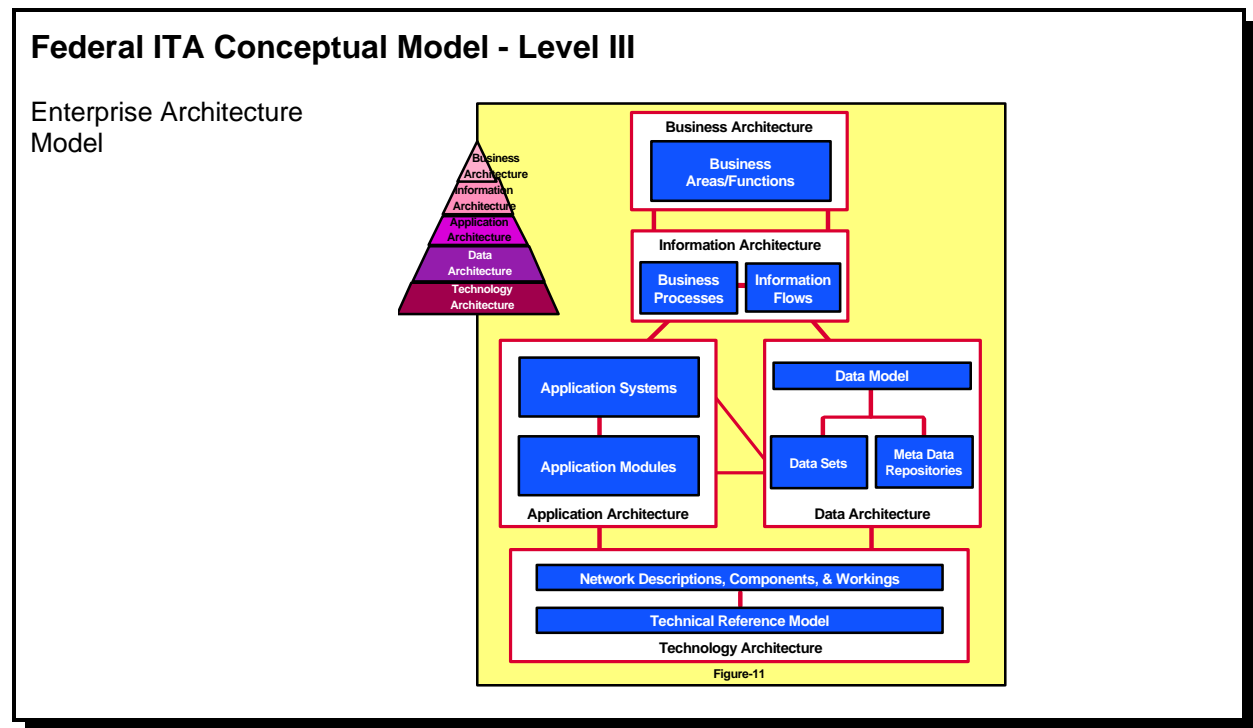
#### 4. Enterprise Architecture Model

The Enterprise Architecture Model consists of five components as depicted in Figure 10 below, and is defined as:

- A component of the Federal ITA Conceptual Model
- A taxonomy for Federal architecture which focuses solely on common Federal entities
- An overall framework used for guiding the development of the Current Architecture and the Target Architecture
- Represents a general model, or taxonomy, for architecture development, does not contain any architecture information, all architecture information resides in the Current Architecture or the Target Architecture



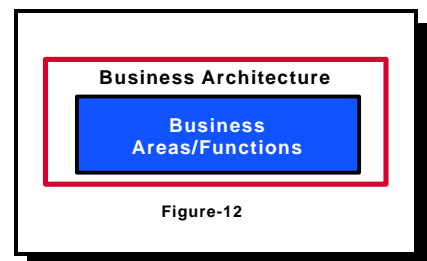
The diagram in Figure 11 below breaks down the five layers of the Enterprise Architecture Model into component parts, which is the third Level of the Model . The diagram is not intended to show sequential flow nor the type of relationships between components, i.e., one-to-one or one-to many. The lines highlight the *existence* of relationships between the components.



#### 4.1 Business Architecture

The Business Architecture is defined as:

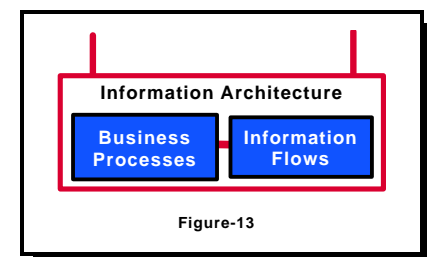
- A component of the Enterprise Architecture Model
- Focuses on common Federal Business Areas
- Identifies and defines core Federal Business Areas and the Functions for each Area
- Identifies the users and locations of the Functions
- Used to identify potential common areas for Federal architecture collaboration



#### 4.2 Information Architecture

The Information Architecture is defined as:

- A component of the Enterprise Architecture Model
- Focuses on common Federal Business Processes and common Federal Information Flows

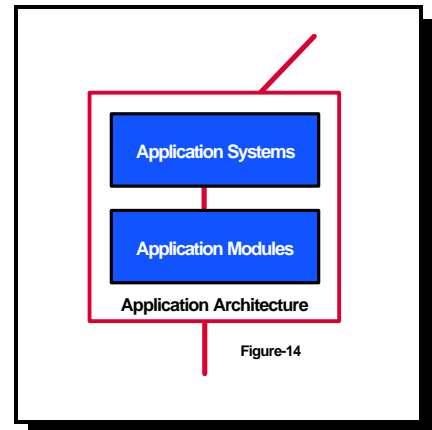


- Identifies and defines:
  - Business Processes
  - Information Flows
  - Information needed to perform Business Functions
  - Relationships between Federal Business Areas/Functions and Information Flows
  - Relationships between Federal Business Areas/Functions and Business Processes
- Used to classify and organize business level information

#### 4.3 Application Architecture

The Application Architecture is defined as:

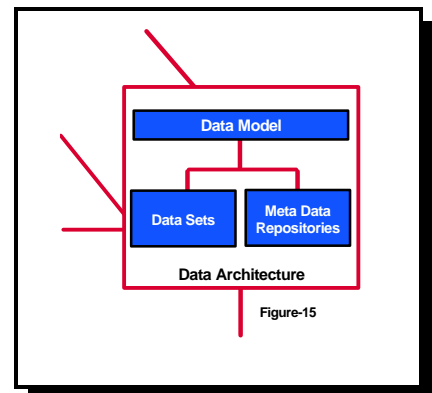
- A component of the Enterprise Architecture Model
- Focuses on common Federal Application Systems
- Identifies and defines:
  - Application Systems
  - Applications Modules
  - Relationships between Application Systems and Business Processes
  - Relationships between Application Systems and Application Modules
  - Relationships between Application Modules and the Federal Network
- Used to define Federal Technology Architecture requirements



#### 4.4 Data Architecture

The Data Architecture is defined as:

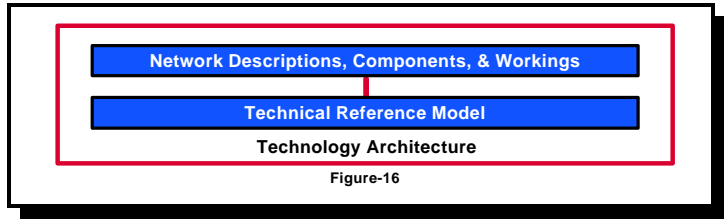
- A component of the Enterprise Architecture Model
- Focuses on common Federal multimedia data
- Identifies and defines:
  - Data Model
  - Data Sets, such as application files and interface files
  - Meta Data Repositories
  - Relationships between the Data Model and Information Flows
  - Relationships between Meta Data and Data Model
  - Relationships between Data Sets and Data Model
  - Relationships between Data Sets and Application Systems
  - Relationships between Data Sets and Application Modules
  - Relationships between Data Sets and the Federal Network
- Used to standardize data for sharing across Federal applications
- Used to define Federal Technology Architecture requirements



#### 4.5 Technology Architecture

The Technology Architecture is defined as:

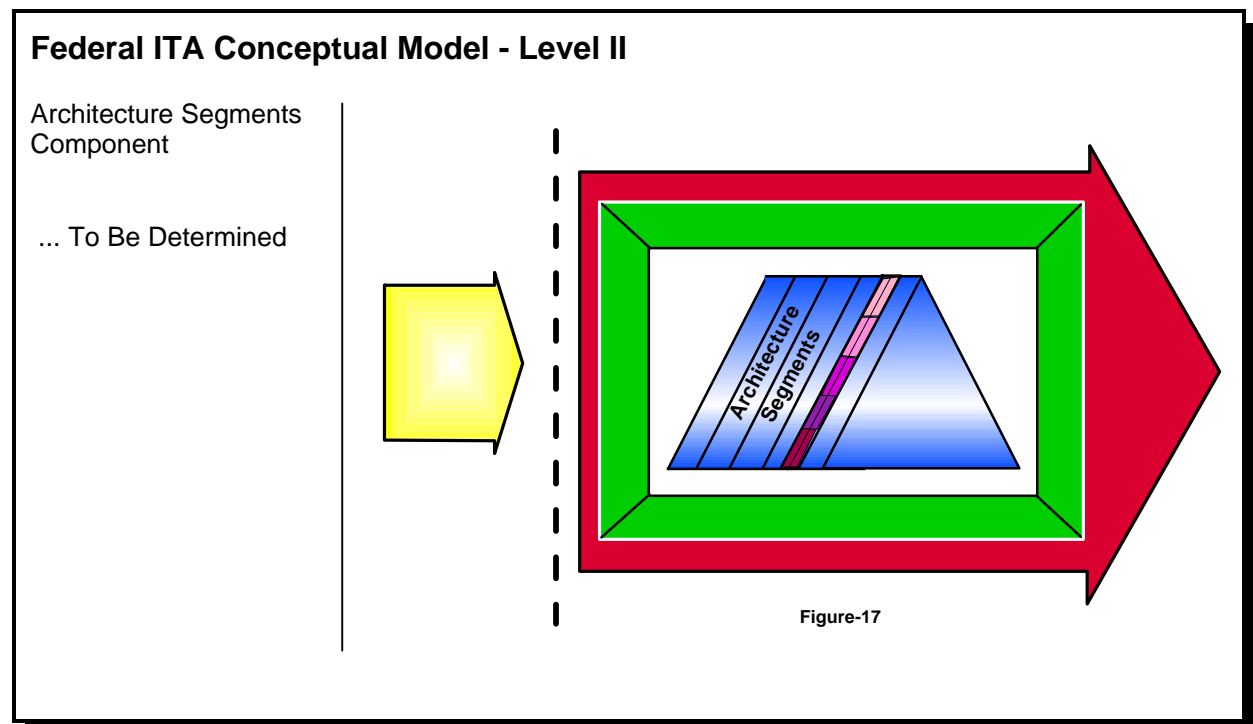
- A component of the Enterprise Architecture Model
- Focuses on common Federal technologies
- A minimal set of rules governing the arrangement, interaction and interdependence of the parts or elements whose purpose is to ensure that a conformant system satisfies a specified set of requirements
- Identifies and defines:
  - Network Descriptions, Components and Workings
  - Technology Reference Model
- Used to standardize communication protocols between Federal locations to enable shared communication



## 5. Architecture Segments

The Architecture Segments consists of several components which are yet to be determined as depicted in Figure 17 below, and is defined as:

- Component of the Federal ITA Conceptual Model
- Represents a vertical slice of the Current and Target Architectures
- Identifies Federal architecture initiatives with potential for Federal architecture collaboration
- A standalone Federal architecture development effort which focuses on a narrowly scoped portion of the Federal Target Architecture
- Must be integrated into the Target Architecture prior to implementation
- Addresses all layers of the Enterprise Architecture Model
- Used for achieving economies of scale through resource sharing
- Examples might include:
  - Federal Electronic Commerce Architecture
  - Federal Email Architecture
  - Federal Geospatial Architecture
  - Federal Security Architecture
  - Federal Public Access Architecture
  - Federal Data Warehouse (Data Marts) Architecture
  - Federal Electronic Records Management Architecture



## **NEXT STEPS**

This Federal ITA Conceptual Model is the first step in improving the communication and sharing of resources among Federal agencies for ITA. The following items are recommended as next steps in adopting the Model.

- Endorse the Model
- Establish Federal Oversight Group

### **Endorse the Model**

It is recommended that the CIO Council endorse the Model as a “Best Practice” for Federal agencies. Agencies should be encouraged to follow the Model, however it should not be mandatory.

### **Establish Federal Oversight Group**

For successful implementation and maintenance of a Federal ITA, it is recommended that a Federal oversight group be established with the necessary resources. The group would be charged with ensuring cohesiveness for the entire Federal ITA and working with the lines-of-business managers, overseeing the horizontal components (layers) of the Enterprise Architecture Model, and developing and maintaining the Architecture Segments. The oversight group would report to the CIO Council.

## GLOSSARY OF TERMS

**Architecture Component:** A piece/part of the Federal ITA Conceptual Model.

**Architecture Subcomponent:** A piece/part of an architecture component.

**Common Federal Elements:** Architecture elements which are common to one or more Federal organizations.

**Horizontal Architectures:** Represent a horizontal view of an Architecture Segment. Horizontal architectures are the Business Architecture, the Information Architecture, the Application Architecture, the Data Architecture, and the Technology Architecture.

**Multimedia Data:** Various forms of data, i.e., voice, text, graphs.

**Subarchitecture:** A lower level architecture. For example, an Agency architecture is a subarchitecture to the Federal architecture.

**Vertical Architectures:** Represent a vertical view of an Architecture Segment. Vertical architectures make up the Current Architecture and the Target Architecture.

## SUBGROUP PARTICIPANTS

*The members of the Federal ITA Conceptual Model Subgroup are gratefully acknowledged for their contribution to the information presented in this document. The Subgroup members are identified below.*

**Francine Yoder**, Chair  
Enterprise IA Planning  
US Environmental Protection Agency

**Anne Mangiafico**  
Enterprise IA Planning  
US Environmental Protection Agency

**Mike Tiemann**  
Information Architect  
US Dept. Of Energy

**Karen Stewart**  
Information Architecture  
US General Services Administration

**Gonza "GK" Kirksey**  
Program Manager  
US General Services Administration

**Alan Proctor**  
CIO Council Support  
US Dept. of the Treasury

**William Bush, Jr.**  
Systems Analyst  
US Dept. Of Education

**Terry Hagle**  
Office of Secretary of Defense  
US Dept of Defense

**Tim Mallon**  
Enterprise IA Planning  
US Environmental Protection Agency

**Pat Simmons**  
Information Architecture Team  
US Dept. Of Energy Contractor w/DynCorp

**George Brundage**  
Emerging Info. Technology Applications  
US General Services Administration

**Leslie Roberts**  
Chief Architect  
US Dept. Of Interior

**Manny DeVera**  
Architecture Planning  
National Institute of Health

**David Prompovitch**  
Architect  
US Dept. Of Transportation

**Adele Graham**  
Information Management Specialist  
US Dept. Of Defense, Army

*Other members of the Subgroup participated by receiving and reviewing information electronically. They include the following:*

**Asghar Noor**  
Chief Architect  
US Dept. of the Treasury

**Crystal Bush**  
Enterprise Tech. Architecture Planning  
US Dept. Of Transportation



**Greg Pace**  
Office of System Planning & Int.  
US Social Security Administration

**Vicki Cordes**  
US VA - Benefits Administration

*The Subgroup acknowledges the work of the various groups who provided valuable recommendations and information which contributed to this document.*

LIST EXPERTS, FAIAWG, ETC. that reviewed the document.